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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/692,548

10/24/2003

Lianjun Liu

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EXAMINER

ROJAS, BERNARD

ART UNIT

PAPER NUMBER

2832

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

04/06/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/692,548	LIU ET AL.	
	Examiner	Art Unit	
	Bernard Rojas	2832	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01/24/2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-11, 13, 17, 18 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-11, 13, 17, 18 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 01/24/2007 have been fully considered but they are not persuasive.

The Applicant states that that prior art of record teaches forming a dielectric layer using plasma enhanced chemical vapor deposition (PECVD) at a temperature between approximately 200 and 300 degrees Celsius. That in Thin Film Processes II by John L. Vossen and Werner Kern [Vossen et al.], a temperature of 250 to 350 degrees Celsius is used in (PECVD) for forming silicon nitride films.

Lin et al. [US 6,818,936] teaches that silicon oxide materials, silicon nitride materials, and silicon oxynitride materials are similar, commonly used dielectric films that are formed by plasma enhanced chemical vapor deposition (PECVD) [col. 6 lines 1-34].

Vossen et al. teaches that plasma enhanced chemical vapor deposition (PECVD), can be used to deposit films similar to silicon nitride films (such as that silicon oxide materials, silicon nitride materials, and silicon oxynitride, as shown by Lin et al.) at a temperature range between 250 and 350 degrees Celsius [page 526].

Therefore the combination of Lin et al. and Vossen et al. yields using by plasma enhanced chemical vapor deposition (PECVD) to apply a silicon oxynitride film.

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

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the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 7, 9-11, 13, 17, 18 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al. [US 6,768,403] in view of Lin et al. [US 6,818,936] and in further view of Thin Film Processes II by John L. Vossen and Werner Kern [Vossen et al.]

Claims 1, 3 and 4, Hsu et al. discloses a method of making a device comprising the steps of: providing a substrate [14]; forming a first conductive layer [18, 20, 22 and 34] over the substrate [figure 4A]; forming a sacrificial layer [46] over the first conductive layer [figure 4B]; forming a dielectric layer [26] over the sacrificial layer, forming a second conductive layer [30] over the sacrificial [figure 4E]; and removing the sacrificial layer [figure 4F].

Hsu et al. fails to disclose that the dielectric layer comprises silicon, oxygen, and nitrogen and is formed by PECVD.

Lin et al. teaches that a common dielectric material in the art is silicon oxide materials, silicon nitride materials, and silicon oxynitride materials that is formed by plasma enhanced chemical vapor deposition (PECVD) [col. 6 lines 1-34].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a silicon oxynitride dielectric material instead of the silicon nitride or silicon oxide discloses by Hsu et al. since it was known in the art as a dielectric material [Lin et al. col. 6 lines 1-34].

Hsu et al. in view of Lin et al. fails to disclose that forming the dielectric layer is performed at a temperature between approximately 200 and 300 degrees Celsius.

Vossen et al. teaches that plasma enhanced chemical vapor deposition (PECVD), a method used by Lin et al., for silicon nitride films is performed at a temperature range between 250 and 350 degrees Celsius [page 526].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a temperature below 300 degrees Celsius when forming the device as discloses Vossen et al. in order to prevent damage to the previous layers to the micro device.

Claim 2, Hsu et al. discloses the method of claim 1, wherein the forming the sacrificial layer comprises forming a polyimide layer [col. 7 lines 40-45, 59-63].

Claims 7, 13 and 20, Vossen et al. teaches that plasma enhanced chemical vapor deposition (PECVD), a method used by Lin et al., for silicon nitride films is performed at a temperature range between 250 and 350 degrees Celsius [page 526].

Hsu et al. in view of Lin et al and in further view of Vossen et al. fails to each that

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PECVD is performed at 240 degrees Celsius. It would have been obvious to one having ordinary skill in the art at the time the invention was made to perform PECVD at a temperature of approximately 240 degrees Celsius, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claims 9-11, Hsu et al. discloses a method of making a microelectronic device comprising the steps of: providing a substrate [14]; forming an input signal line [18] over the substrate; forming an output signal line [20] over the substrate and spaced apart from the input signal line [figure 4A]; forming a sacrificial layer [46] over the input signal line and the output signal line [figure 4B]; forming a dielectric layer [26] over the sacrificial layer [figure 4C]; removing the sacrificial layer [figure 4F]; and forming a conductive layer [30] over the dielectric layer.

Hsu et al. fails to disclose that the dielectric layer comprises silicon, oxygen, and nitrogen and is formed by PECVD.

Lin et al. teaches that a common dielectric material in the art is silicon oxynitride that is formed by plasma enhanced chemical vapor deposition (PECVD) [col. 6 lines 1-34].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a silicon oxynitride dielectric material instead of the silicon nitride or silicon oxide disclosed by Hsu et al. since it was known in the art as a dielectric material [Lin et al. col. 6 lines 1-34].

Hsu et al. in view of Lin et al. fails to disclose that forming the dielectric layer is performed at a temperature between approximately 200 and 300 degrees Celsius.

Vossen et al. teaches that plasma enhanced chemical vapor deposition (PECVD), a method used by Lin et al., for silicon nitride films is performed at a temperature range between 250 and 350 degrees Celsius [page 526].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a temperature below 300 degrees Celsius when forming the device as discloses Vossen et al. in order to prevent damage to the previous layers to the micro device.

Claims 17 and 18, Hsu et al. discloses a method of making a device comprising the steps of: providing a substrate [14]; forming a first conductive layer [18, 20, 22 and 34] over the substrate [figure 4A]; forming a sacrificial layer [46] over the first conductive layer [figure 4B]; forming a dielectric layer [26] over the sacrificial layer [figure 4C]; forming a second conductive layer [30] over the sacrificial layer [figure 4E]; and removing the sacrificial layer [figure 4F].

Hsu et al. fails to discloses that the dielectric layer comprises silicon, oxygen, and nitrogen and is formed by PECVD.

Lin et al. teaches that a common dielectric material in the art is silicon oxynitride that is formed by plasma enhanced chemical vapor deposition (PECVD) [col. 6 lines 1-34].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a silicon oxynitride dielectric material instead of the silicon

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nitride or silicon oxide discloses by Hsu et al. since it was known in the art as a dielectric material [Lin et al. col. 6 lines 1-34].

Hsu et al. in view of Lin et al. fails to disclose that forming the dielectric layer is performed at a temperature between approximately 200 and 300 degrees Celsius.

Vossen et al. teaches that plasma enhanced chemical vapor deposition (PECVD), a method used by Lin et al., for silicon nitride films is performed at a temperature range between 250 and 350 degrees Celsius [page 526].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a temperature below 300 degrees Celsius when forming the device as discloses Vossen et al. in order to prevent damage to the previous layers to the micro device.

Claims 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hsu et al. [US 6,768,403] in view of Lin et al. [US 6,818,936], in view of Thin Film Processes II by John L. Vossen and Wener Kern [Vossen et al.] and in further view of Murakami et al.

Claims 5 and 8, Hsu et al. in view of Lin et al., and in further view of Vossen et al. discloses the claimed method of making a device with the exception that the dielectric layer comprises silicon, oxygen, nitrogen and hydrogen that are formed by PECVD.

Murakami et al. teaches forming a silicon oxynitride dielectric film comprising N₂O; N₂; NH₃; and SiH₄ by plasma CVD [paragraph 87].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use a silicon oxynitride dielectric material instead of the silicon

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nitride or silicon oxide discloses by Hsu et al. since it was known in the art as a dielectric material [as taught by Lin et al. col. 6 lines 1-34].

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard Rojas whose telephone number is (571) 272-1998. The examiner can normally be reached on M and W-F, 5:30-3:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin G. Enad can be reached on (571) 272-1990. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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